AMENDMENT TO THE CLAIMS

1. (Currently Amended) A miniature endoscope for orthopedic imaging comprising:

a probe for orthopedic diagnostic imaging, the probe including ~~an optical~~ a fiber optic imaging waveguide that transmits an image, and having a diameter of less than 2 mm and a length between 2 cm and 10 cm, the probe having a mounting hub;

a fiber optic illumination channel within the probe that is concentric about the optical waveguide, the illumination channel being positioned between an inner sheath and an outer sheath;

a handle removeably attached to the mounting hub of the probe with a connector;

a light source ~~mounted in the handle~~ that is optically coupled to the fiber optic illumination channel with the mounting hub;

a cannula that receives a distal end of the probe such that the outer sheath slides within the cannula, the cannula having a locking mechanism at a proximal end that attaches to the probe;

a sterile barrier attached to the mounting hub and that can be extended over the handle;

an optical lens coupled to a distal end of the waveguide;

an optical relay mounted in the handle and that is optically coupled to a proximal end of the waveguide; and

an imaging device mounted in the handle at a proximal end of the optical relay that receives an image from the optical waveguide.

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2. (Original) The miniature endoscope of Claim 1 wherein the endoscope has an outer diameter of 1.6 mm or less.

3. (Original) The miniature endoscope of Claim 1 wherein the waveguide has an outer diameter between 0.6 and 1.6 mm.

4. (Previously Presented) The miniature endoscope of Claim 1 wherein the illumination channel includes a binary phase ring which disperses light from the illumination channel.

5. (Original) The miniature endoscope of Claim 1 wherein the waveguide comprises a glass having a refractive index in the range between 1.6 and 1.9.

6. (Original) The miniature endoscope of Claim 1 wherein the waveguide comprises a glass rod.

7. (Previously Presented) The miniature endoscope of Claim 1 wherein the optical waveguide further comprises a light absorbing layer having a thickness between 5 and 10 μm.

8. (Previously Presented) The miniature endoscope of Claim 1 wherein the optical waveguide further comprises a light absorbing layer having an extramural absorption glass.

9. (Previously Presented) The miniature endoscope of Claim 1 wherein the optical waveguide further comprises a light absorbing layer having a refractive index of 1.6 or less.

10. (Previously Presented) The miniature endoscope of Claim 1 wherein the illumination channel has a wall thickness in a range of 0.1 mm and 0.2 mm.

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11. (Previously Presented) The miniature endoscope of Claim 1 wherein the illumination channel has a refractive index in a range between 1.4 and 1.6.

12. (Previously Presented) The miniature endoscope of Claim 1 wherein the outer sheath comprises a metal tube.

13. (Original) The miniature endoscope of Claim 12 wherein the outer sheath comprises a polyamide coating.

14. (Original) The miniature endoscope of Claim 13 wherein the polyamide coating has a thickness between 100 and 150 μm.

15. (Previously Presented) The miniature endoscope of Claim 1 wherein the optical relay comprises one or more lenses.

16. (Previously Presented) The miniature endoscope of Claim 1 wherein the optical lens comprises a plastic lens.

17. (Original) The miniature endoscope of Claim 1 wherein the imaging device comprises a charge coupled device.

18. (Previously Presented) The miniature endoscope of Claim 1 wherein the cannula further comprises a distal needle that penetrates tissue.

19-21 (CANCELLED)

22. (Previously Presented) The miniature endoscope of Claim 1 further comprising a display connected to the imaging device.

23. (Previously Presented) The miniature endoscope of Claim 1 wherein the illumination channel is optically coupled to a light source with a lens in the handle.

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24. (Previously Presented) The miniature endoscope of Claim 1 further comprising an optical coupler that optically connects the light source to the illumination channel.

25. (Previously Presented) The miniature endoscope of Claim 1 wherein the cannula further comprises a fluid delivery port.

26. (Previously Presented) The miniature endoscope of Claim 25 wherein the barrier is attached to a rigid waveguide housing that is connected to the handle.

27. (Previously Presented) The miniature endoscope of Claim 1 wherein the light source comprises a lamp within the handle that is optically coupled to the illumination channel.

28. (Currently Amended) A miniature endoscope for orthopedic imaging comprising:

a probe for orthopedic diagnostic imaging, the probe including ~~an~~ a fiber optic imaging channel having a diameter in a range of 0.6 mm to 1.6 mm and the probe having a diameter less than 2 mm and a mounting hub;

a tube surrounding the imaging channel;

a fiber optic illumination channel within the probe that is concentric about the tube and the imaging channel and a light source ~~mounted within the handle~~ that is optically coupled to the fiber optic illumination channel with the mounting hub attached to the handle, the illumination channel having a thickness in a range of 0.1 mm to 0.2 mm;

an outer tube around the fiber optic illumination channel;

a handle removably attached to the probe with a connector;

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a cannula that receives a distal end of the probe such that the distal end of the probe slides within the cannula, the cannula having a locking mechanism at a proximal end that attaches to the probe;

a sterile barrier attached to the mounting hub that can be extended over the handle;

a first lens and a second lens that are optically coupled to a distal end of the imaging channel;

an optical relay mounted in the handle and optically coupled to a proximal end of the imaging channel; and

an imaging device mounted in the handle and optically coupled to a proximal end of the optical relay.

29. (Original) The miniature endoscope of Claim 28 wherein the imaging device comprises a charge coupled device.

30. (Original) The miniature endoscope of Claim 28 wherein the imaging channel comprises a transparent material having a refractive index of at least 1.6.

31. (Original) The miniature endoscope of Claim 30 wherein the imaging light channel comprises a glass rod.

32. (Original) The miniature endoscope of Claim 31 wherein the glass rod comprises an F2 or an F7 glass.

33. (Previously Presented) The miniature endoscope of Claim 28 further comprising a light absorbing layer around the imaging channel.

34. (CANCELLED)

35. (Previously Presented) The miniature endoscope of Claim 28

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wherein the illumination channel is coupled to the light source with a fiber optic connector.

36-38 (Cancelled)

39. (Previously Presented) The miniature endoscope of Claim 28 wherein the endoscope has a display connected to the imaging device for arthroscopic examination.

40-42 (CANCELLED)

43. (Withdrawn) A method of forming a reflective boundary on a glass channel for a microendoscope comprising the steps:

providing a glass channel for a microendoscope; providing a light absorbing material;

extruding the light absorbing material over the glass channel to form a reflective boundary on the glass channel.

44. (Withdrawn) The method of Claim 43 further comprising the step of using a fiber optic drawing process to extrude the light absorbing material over the glass channel.

45. (Withdrawn) The method of Claim 43 further comprising the step of using a bar-in-tube drawing process to extrude the light absorbing material over the glass channel.

46. (Withdrawn) A method of forming an image light channel for a microendoscope comprising the steps:

providing an illumination channel having a refractive index;

coating an inner surface and an outer surface of the illumination channel with a material having a refractive index lower than the illumination channel refractive index;

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providing an image light channel for a microendoscope; and

attaching the illumination channel to the image light channel.

47. (Withdrawn) The method of Claim 46 further comprising the step of using a tube-extrusion process for form the coatings on the illumination channel.

48. (Withdrawn) The method of Claim 46 further comprising the step of depositing a glass on the outer surface and the inner surface of the illumination channel.

49. (Withdrawn) The method of Claim 46 further comprising the step of using a bar-in-tube fiber drawing process to fuse the illumination channel to the image light channel.

50. (Withdrawn) A method of forming a cladding structure on an image light channel for a microendoscope comprising the steps:

providing an image light channel;

forming a material having an index of refraction on the image light channel that is lower than the index of refraction of the image light channel to form a first cladding; extruding an illumination channel over the first cladding on the image light channel; and

forming a second cladding on the illumination channel.

51. (Currently Amended) A miniature endoscope for orthopedic imaging comprising:

a handle having an imaging device, and a light source ~~mounted~~ coupled to a fiber optic device within the handle and a first coupling element;

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a sterile barrier that can be extended over the handle;

a rigid probe removeably attached to the handle with a connector and having a diameter of less than 2 mm for insertion within an orthopedic body portion of a patient, an illumination waveguide that is concentric about an imaging channel and a second coupling element that connects the rigid probe to the first coupling element such that the imaging channel having a diameter in a range of 0.6 mm to 1.6 mm and that is optically coupled to the imaging device;

a cannula having a fluid delivery port; and

a lens at a distal end of the imaging channel.

52-58 (CANCELLED)

59. (Currently Amended) The miniature endoscope of Claim 51 wherein the light source is coupled to the illumination waveguide ~~with a fiber optic element~~, the illumination waveguide having a thickness in a range of 0.1 mm to 0.2 mm.

60. (Previously Presented) The miniature endoscope of Claim 51 wherein the probe comprises a fiber optic illumination channel around the imaging channel, the imaging channel further comprising a second lens at the distal end of the imaging channel.

61. (Currently Amended) The miniature endoscope of Claim 51 wherein the light source ~~comprises~~ is optically coupled to a ~~lamp within the handle~~fiber optic reducer.

62. (Previously Presented) The miniature endoscope of Claim 61 wherein the lamp is coupled to the illumination waveguide with a lens.

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63. (Previously Presented) The miniature endoscope of Claim 51 wherein the sterile barrier is attached to the probe.

64. (Previously Presented) The miniature endoscope of Claim 63 wherein the sterile barrier is attached to a disposable probe element.

65. (Previously Presented) The miniature endoscope of Claim 51 wherein the cannula has a locking mechanism that attaches the cannula to the probe.

66. (Previously Presented) The miniature endoscope of Claim 51 wherein the probe fits within the cannula.

67. (Previously Presented) The miniature endoscope of Claim 66 wherein the imaging channel comprises a rod and wherein the endoscope further comprises a locking mechanism wherein the cannula locks onto a hub on the probe.

68. (Previously Presented) The miniature endoscope of Claim 66 wherein the cannula comprises a needle.

69. (Original) The miniature endoscope of Claim 66 wherein the cannula further comprises a stylet.

70. (Withdrawn) A method of using a miniature endoscope comprising:

providing a base unit and a sheath assembly having a probe waveguide and a sterile barrier; and

attaching the sheath assembly to the base unit such that the sterile barrier extends over the base unit.

71. (Withdrawn) The method of Claim 70 further comprising

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providing a cannula and securing the cannula to the sheath assembly.

72. (Withdrawn) The method of Claim 70 further comprising providing a luer fitting on the sheath assembly.

73. (Withdrawn) The method of Claim 70 further comprising disposing of the sheath assembly after use and attaching a second sheath assembly to the base unit for further use.

74. (Withdrawn) The method of Claim 70 further comprising providing a probe waveguide having a hollow channel and a light absorbing channel wall.

75. (Withdrawn) The method of Claim 70 further comprising providing a base unit including a handle, an imaging device within the handle and a relay optical system that couples an image from the waveguide to the imaging device.

76. (Withdrawn) The method of Claim 70 further comprising providing a probe waveguide having a diameter of 2 mm or less.

77. (Withdrawn) The method of Claim 70 further comprising connecting the base unit to a display.

78. (Withdrawn) The method of Claim 70 further comprising providing an annular illumination channel in the probe.

79. (Withdrawn) The method of Claim 70 further comprising providing a probe waveguide having a length between 2 cm and 10 cm.

80. (Withdrawn) The method of Claim 70 further comprising directing polarized light through the waveguide.

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81. (New) The endoscope of claim 1 further comprising a tube around the optical waveguide and an outer tube around the fiber optic illumination channel.

82. (New) the endoscope of claim 81 wherein the outer tube is a plastic material.

83. (New) The endoscope of claim wherein the endoscope probe has a length to diameter ratio between 40:1 and 60:1.

84. (New) The endoscope of claim 1 further comprising a computer connected to the imaging device.

85. (New) The endoscope of claim 84 further comprising an image processing sequence.

86. (New) The endoscope of claim 85 wherein the image processing sequence subtracts a stored light distribution pattern from a video image.

87. (New) The endoscope of claim 86 wherein the stored light distribution pattern corresponds with a light reflection pattern for the endoscope.

88. (New) The endoscope of claim 81 wherein the tube comprises a metal.

89. (New) The endoscope of claim 1 wherein the concentric illumination channel has a thickness of 10 microns.

90. (New) The endoscope of claim 1 wherein the concentric illumination channel has a thickness of 30 microns.

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